

Bionomics of *Dysdercus koenigii* Fabr. (Hemiptera: Pyrrhocoridae)¹SHRIPAT T. KAMBLE²

ENTOMOLOGY DEPARTMENT, COLLEGE OF AGRICULTURE, NAGPUR, INDIA

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Abstract: The cotton stainer, *Dysdercus koenigii* Fabr., is an important pest of cotton. By feeding on half opened cotton bolls and seeds, the oil content and seed viability is reduced and the excreta of the insect spoils the cotton lint. Eggs are oval, smooth, creamy yellow in color with an average incubation period of 6.18 days. The period of the first, second, third, fourth and fifth instars are from 3 to 4, 3 to 4, 3 to 5, 6 to 8 and 12 to 16 days, respectively. The adults live from 9 to 25 days and the life cycle extends from 51 to 61 days. This bug is present throughout the year and also feeds on okra, hollyhock, eggplant and other malvaceous plants. The alternate hosts reported for the first time are falsa, rohan and eggplant.

The cotton stainer, *Dysdercus koenigii* Fabr., is indigenous to India and reported from all cotton producing areas. It causes considerable damage by reducing plant vigour, staining the lint, reducing the oil content and the germination of seeds.

In the Vidarbha region of Maharashtra state, no substantial research has been done on *D. koenigii* Fabr., and this study was undertaken to gain information on the bionomics and importance of this species.

MATERIALS AND METHODS

LABORATORY STUDIES: The laboratory rearing of *D. koenigii* was started from adults collected from okra fields, at room temperature (24° to 25° C.). Cages 4" × 4" and goblets 3" in diameter and 4" in height were used for the rearing. Initially, okra fruits and later, half opened cotton bolls were provided as food. In the open field area (near rearing room), potted plants covered with muslin hoods were used for observation of egg laying and feeding habits.

Observations were made on eggs to determine color, size shape and incubation period, and on nymphs to determine the duration of the instars, distinctive morphological characters and the feeding habits. The measurements of different body parts of various instars were made with an ocular micrometer. Precopulation period, copulation period, oviposition period, the egg laying capacity of female and the longevity of males and females were also recorded.

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² Present address: Entomology Department, North Dakota State University, Fargo, North Dakota 58102.

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TABLE 1. Measurements in mm. of *D. koenigii* Fabr.

	Egg	Instar					Adults	
		First	Second	Third	Fourth	Fifth	Male	Female
Length of egg	Min.	1.06						
	Max.	1.20						
	Ave.	1.13						
Width of egg	Min.	0.78						
	Max.	0.88						
	Ave.	0.80						
Length of body	Min.	1.40	2.00	4.00	5.00	8.00		
	Max.	1.70	2.40	4.50	6.00	10.10		
	Ave.	1.56	2.10	4.12	5.50	9.38	13.01	15.04
Width of body	Min.	0.78	1.30	1.60	2.50	3.25		
	Max.	0.81	1.60	1.80	3.00	3.50		
	Ave.	0.80	1.50	1.77	2.55	3.30	7.04	9.07
Length of antennae	Min.	0.94	0.80	2.45	4.36	6.00		
	Max.	0.96	1.00	2.90	4.50	6.50		
	Ave.	0.94	0.90	2.57	4.46	6.22	9.00	9.07
Distance between eyes	Min.		0.50	0.60	0.67	0.87		
	Max.		0.60	0.80	0.90	0.90		
	Ave.		0.56	0.70	0.80	0.88	1.57	1.83
Length of proboscis	Min.	0.94	1.80	2.40	3.79	5.58		
	Max.	0.96	2.10	3.00	4.20	6.62		
	Ave.	0.95	1.94	2.60	4.00	6.34	6.87	7.05
Length of wing pads	Min.				0.70	2.20		
	Max.				1.00	2.50		
	Ave.				0.99	2.44		
Length of fore wings	Min.							
	Max.							
	Ave.						22.04	25.99
Length of hind wing	Min.							
	Max.							
	Ave.						9.03	11.87

FIELD STUDIES: Four fields were selected to study the periodical infestation of *D. koenigii* on cotton; one each to the north, the south, the east and the west of the insectary. Fortnightly observations were taken on the above fields. Observations on hollyhock, falsa, silk-cotton, eggplant and rohan plants (without muslin hood) were made to see whether they serve as alternate hosts.

OBSERVATIONS

LABORATORY STUDIES: Eggs were laid near half opened cotton bolls in rearing cages and goblets. On potted plants, the eggs were laid in cracks and crevices of soil and covered by loose soil or dried leaves. The egg laying capacity of each female varied from 27 to 144, with each egg oval in shape, soft and creamy yellow in color. Three days later, each egg had three red spots, two on anterior and one on posterior side. The incubation period varied from 4.73 to 7.33 days with an average of 6.18 days. Measurements of eggs are given in Table 1.

Hatching was achieved by rupturing of the chorion along the dorsal midline. The nymph emerged with the dorsal surface oriented downward and the ventral surface upward. The elapsed time from wriggling of egg to hatching was 8 to 12 minutes.

The newly hatched nymph was yellowish in color with transparent legs and antennae. All tarsae had 3 segments and the antennae 4 segments. Three distinct spots, the opening of stink glands, were observed on the intersegmental membranes of the abdomen, between segments 3 to 4, 4 to 5, and 5 to 6. The duration of the instar was 3 to 4 days. Measurements of various organs and regions are given in Table 1.

The second instar nymph was orange in color immediately after molting but changed to a dark red in the post molting period. The rostrum had 4 segments. Duration of second instar was from 3 to 4 days. The various measurements are given in Table 1.

The most important feature of the third instar nymph was the appearance of wing pads. As previously observed, the stink gland openings were prominent. The three transverse white bands were observed on the ventral side of second, third and fourth sternal plates. This nymphal stage extended from 3 to 5 days. Measurements are given in Table 1.

The fourth instar nymph was blood red in color. A characteristic of this nymph was the presence of a faint white collar behind the head. The stink gland openings were more conspicuous. An additional transverse white band was observed on ventral side of fifth abdominal sternal plate. This instar lasted from 6 to 8 days. Measurements are given in Table 1.

The white collar, first observed in the previous instar became more prominent in the fifth instar. Wing pads extended to the fourth abdominal segment. A fifth transverse ventral white band was observed on the sixth abdominal sternal plate. This instar lasted from 12 to 16 days. Measurements are given in Table 1.

Adults emerged in the final molt which took 22 to 25 minutes. Wings were unfolded within 15 to 18 minutes. The newly molted adults were orange in color but changed to blood red within 4 to 5 hours. Morphologically males and females were similar except for external genitalia and body size. The measurements of different parts of males and females are given in Table 1.

The precopulation period varied from 3 to 5 days after emergence of the imago from the last nymphal molt. Copulation continued from 7 to 70 hours and the oviposition period from 1 to 5 days after copulation. Males lived from 9 to 24 days and females from 14 to 25 days. The sex ratio of male to female was 50.50 to 48.50. The total cycle varied from 51 to 61 days.

The feeding habits of nymphs and adults were similar except for their gregariousness during feeding. When food was scarce nymphs and adults were commonly cannibalistic.

Both nymphs and adults attacked half opened cotton bolls, in commerce this reduces the oil content and power of germination of seeds and the yellow insect excreta gives a dirty yellow color to the lint further reducing its market price. In addition newly laid eggs and insects may be crushed during picking, increasing the staining of the lint.

FIELD STUDIES: Under field conditions from October to February, cotton was the insects main source of food and there was a population peak period from December to January. From March to June, the insect was present on hollyhock, irrigated cotton and silk-cotton and from July to September, okra served as an alternate host. It was also observed that okra, silk-cotton, eggplant, rohan, falsa, hollyhock and other malvaceous plants also served as alternate hosts.

Literature Cited

- BALLARD, E. 1925. Notes on insects. Madras Agri. Dept. Yearbook, 1922: 27-31.
- HEM SINGH. 1924. On anatomy and bionomics of the red cotton bug *Dysdercus cingulatus*, Fabr. J. Proc. Asiatic Soc. Bengal, 15-42.
- LEFROY, MAXWELL H. 1908. Memoirs Dept. Agri. Indian Ent. Serv., 2: 47-48.
- SHRIVASTAVA, U. S., AND J. BAHADUR. 1961. Observations on life history of red cotton bug, *Dysdercus cingulatus* Fabr. Indian J. Entomol. 20: 228-234.